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BIOGRAPHY

JOHN JACOB ABEL

1857-1938

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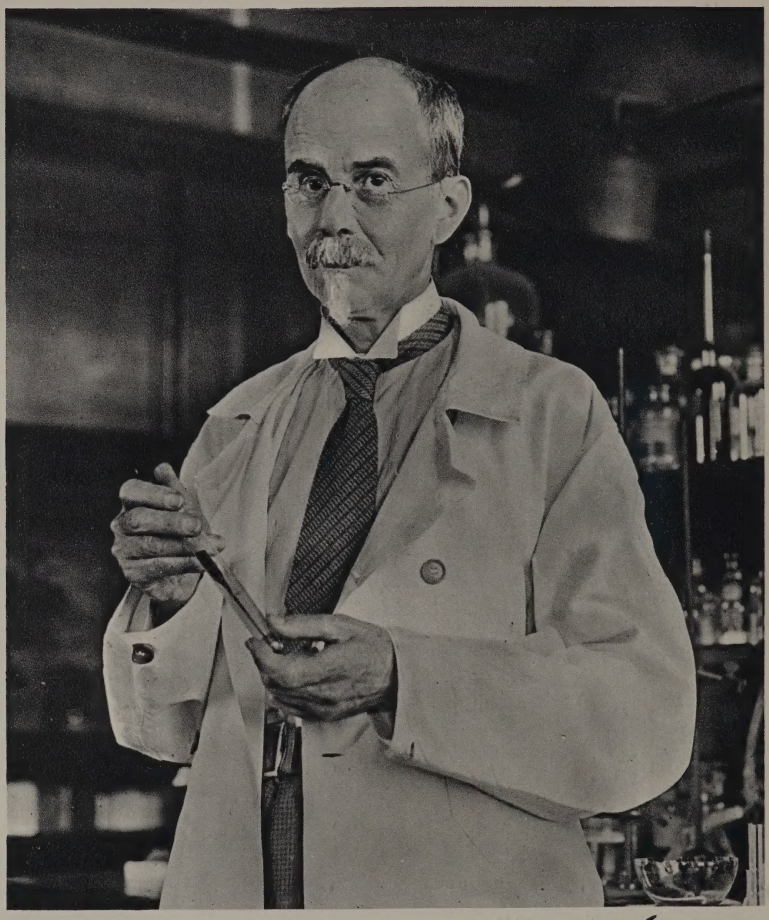

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By a sad coincidence, the official notification to Professor Abel of his election to the Foreign Membership of the Royal Society was delivered on the day of his death, 26 May 1938. It is a loss to the Society, that one who was justly held in such high regard by workers in Pharmacology and the neighbouring fields of medical science, in his own country and widely beyond it, should thus never have been effectively of the distinguished company of our Foreign Members. It is known, however, through his friends, that the news of his election had reached him, and had given him pleasure, during his last, brief illness.

Abel was born on 19 May 1857 on a farm near Cleveland, Ohio, into a family which came originally from the German Rhineland. There is nothing recorded of his ancestors to suggest an inheritance of qualities making for eminence in science. It seems probable that his university training was won largely by his own determination and enterprise; for it is on record that he interrupted his college course for three years, during which he acted as head of a high school in Indiana and taught a wide range of subjects—Latin and mathematics, as well as physics and chemistry. He ultimately graduated as Ph.B. at the University of Michigan in 1883. In the same year he married Miss Mary Hinman, whom he had met as a fellow school-teacher. Mrs Abel was his devoted helper and comrade for the rest of their active lives, winning the warm regard of the many whom Abel taught and inspired, and dying a few months before him.

On graduation Abel appears to have set his course definitely for scientific medicine as his life's work. He spent a year in post-graduate study under Newell Martin, one of Michael Foster's early pupils at Cambridge, who had then recently become the first Professor of Physiology at Baltimore, and one of the pioneers of that science in America. Then, for the next seven years, Abel was in central Europe, spending periods at many of its famous medical schools, and studying under many of the leaders in medical science of that era—under Ludwig in physiology, Drechsel, Hoppe-Seyler, and v. Nencki in biochemistry, and Schmiedeberg in pharmacology; it was probably the influence

of the last of these that fixed his choice more closely on pharmacology as his main interest. In addition he studied chemistry, pathology, and clinical medicine under leaders of renown, and graduated as M.D. in Strassburg. This long period of training might have been expected to create in Abel new and strong associations with the Europe of his ancestors, and especially with Germany. Nobody who knew him in later years, however, could doubt that the influence of the land of his birth and upbringing remained prepotent. He retained wide sympathies and contacts, and treasured memories of his teachers, but he remained typically and staunchly American in sentiment and habit of mind. It must have given him great joy, therefore, when in 1891 his old University of Michigan, at Ann Arbor, called him, on Schmiedeberg's recommendation, to be its Professor of Materia Medica and Therapeutics. The Chair, during Abel's tenure, became the first in America to deal with pharmacology as a separate experimental science, distinct from the practice of therapeutics in the clinic ; so that Abel, at the age of 34, was called to inaugurate a department of medical science not then represented in his own country. He was to stay at Ann Arbor for only two years, however, being invited in 1893 to become the first Professor of Pharmacology in the Johns Hopkins Medical School, Baltimore, already widely famous through its distinguished staff. Here Abel was to be for the remainder of his life, holding the Chair of Pharmacology till his retirement in 1932, and even then continuing his researches, with hardly perceptible abatement of his diligence or his eager interest, right up to the onset of his last, brief illness.

In his earlier years in Baltimore, though his chair was that of pharmacology, Abel was responsible for the teaching of physiological chemistry in addition. The unusual width of his training had qualified him for the dual obligation, and he retained it for fifteen years, till, in 1908, a separate Chair of Physiological Chemistry was created. Abel was thus among the earlier promoters of biochemistry, as well as of pharmacology, as a separate subject of teaching and research in America. It is noteworthy that he was associated with the late Dr Christian Herter in founding the *Journal of Biological Chemistry* in 1905, retiring from editorial work for that Journal in 1909, when he founded the *Journal of Pharmacology and Experimental Therapeutics*, which he continued to edit till he retired from his Chair in 1932. He was prominent also among the founders of the American Society of Biological Chemists, as well as of the American Pharmacological Society.

In these circumstances it was natural that Abel should choose his problems for investigation on the chemical side of pharmacology and

physiology. After early work on sulphur metabolism, originating in his studies under Drechsel, Abel became interested in the chemistry of the intensely active pressor substance, which the physiological observations of Schafer and others had then recently revealed in the medulla of the suprarenal gland. He began to publish on the subject in 1897, and in 1899 described the active principle as " Epinephrine". He had undoubtedly isolated it as a tribenzoyl-compound, but his hydrolysis was incomplete, and the substance which he described, and accurately formulated, was later shown to be still a monobenzoyl-derivative of the active principle itself. With but short opportunity for further investigation of his own preparations, Abel would undoubtedly have discovered this for himself. He found himself forestalled, however, and the name adrenaline, given to the first preparation of the free principle, was widely adopted in Europe. Scientific opinion in America, recognizing Abel's essential priority, adopted and retained his name " epinephrine " for the active principle, the discovery of which his work had made possible and had brought within sight of completion. Years later his early experience of the properties of epinephrine led him to recognize its presence where nobody would have expected it, or sought for it deliberately—in the secretion of the skin glands of a South American toad, and there in a truly astonishing and still unexplained concentration. At the same time, from the same secretion, he isolated and characterized the highly poisonous principle which he named " bufagin". This was a substance having a powerful action of the digitalis type. Other papers had meanwhile been published by him, as usual in collaboration, on the poisons of the toadstool, *Amanita phalloides*, and on the convulsant action of the dye, acid fuchsin, on frogs. These latter observations led him, by way of friendly controversy, to a demonstration of the significance of the frog's lymph hearts in the absorption of poisons.

Abel's researches, usually made in collaboration with one or more of his pupils, covered a wide range, but most of them had such a biochemical outlook. Mention may be made of the search, in the phthalein series, for substances having a laxative action with hypodermic injection, leading ultimately to the discovery of the diagnostic value of phenolsulphone-phthalein (phenol red) as a test of kidney function, and of that of its iodine derivative in skiagrams of the biliary passages. An ingenious method of subjecting the circulating blood to dialysis enabled a study to be made of the amino-acids normally present in the plasma ; and the discovery that frequently repeated exsanguination was compatible with life, if the washed corpuscles were returned to the circula-

tion, led to an investigation of the regeneration of the plasma and its proteins. Some years were devoted to researches on the distribution of histamine in tissues, and on its apparent formation in partial protein hydrolysis ; and among the results obtained were some which probably deserve more attention than they have received in recent investigations by others. These studies suggested to Abel a connexion between histamine and the activity of extracts from the pituitary posterior lobe. The suggestion was not substantiated by further work, but it led him to a long-continued effort to isolate from that lobe what he believed to be a single hormone, of multiple activities. Though his success was not complete, the record of his experience contains much of permanent value, and he was at least as near to the isolation of a chemical entity as any of the other investigators, whose interest had been stimulated by his enthusiasm for the quest, or by friendly controversy with him.

Not daunted by this partial disappointment, Abel embarked on what many might have regarded as an even more difficult and unpromising enterprise, aiming at the isolation of insulin. His instinct was justified, and his scientific courage rewarded, by an achievement which will probably be one of those most permanently associated with his name. In 1926 he described the first preparation of insulin in the form of well-defined crystals. His observation was soon confirmed by others, and, with improved methods, the crystallization and recrystallization of insulin has now become applicable to the large-scale purification of the hormone, and has furnished an ultimate and invariable standard for its quantitative determination.

In 1932, at the age of 75, Abel retired from the Chair at Baltimore, which he had held with such distinction for 39 years. Most men of his age would have looked forward to some years of leisure for other interests, such as he did not lack. The passion for investigation was still strong in him, however, and opportunity was made for him as Director of a small, special department of Endocrinological Research. It may be that this attempt to label him as an endocrinologist was effective in turning his thoughts from the hormones, which had hitherto held so central a position in his interests. In any case, his many friends and admirers were surprised to find him soon active in what was, for him, an entirely new field of investigation on tetanus toxin, its mode of action and distribution in the body. For a year or two he seemed to be groping, but he then found a clear line of advance. Experience in pharmacology and biochemistry enabled him to view the problem from new angles, and he retained a freshness of imagination and an independence of outlook remarkable at his age. On his eightieth birthday,

and for nearly a year after it, he was still eagerly and fruitfully at work in his laboratory.

No record of Abel's researches and their results, important though these are, can give any indication of what his life and his personality meant for medical science, especially in his own country. Mention has been made of his multiple activities as an editor, and as an organizer of collaboration and fellowship, in several branches of medical science. The list of his publications contains many of addresses on general topics of medical science and education. It meant much that, with all these external activities, and the regular and effective discharge of a heavy teaching obligation, he continued throughout his long life to give an example of enthusiastic and unremitting devotion to the increase of knowledge for its own sake by research. By no means narrow or pedantic in his interests, he was genial and friendly, and not at all averse from social enjoyments, though thrifty and almost ascetic in his personal habits. There could be no doubt, however, that the matter of central importance and interest to him was the progress of knowledge by research, especially in the fields in which he had himself been engaged. He was at his best and happiest in eager discussion with friends of like interests, and especially with his pupils, whom he so readily made his friends. Never was a man of his distinction more completely free from the assumption of an authority to which his experience and seniority might have entitled him; he was ready to discuss on terms of a friendly equality with the most junior among his co-workers, if only he felt an answering keenness. Entirely characteristic of his selfless devotion to science was his reaction when, while his researches on insulin were in progress, he had the misfortune to break his leg—no light matter for a man of his years. When his leg had been encased in plaster, and as soon as he could move on crutches, he was driven to his laboratory; and there a friend found him at the bench, with his leg in its plaster case supported on a stool, protesting that "a little pain is not really a hindrance to research; on the contrary, it helps to keep one alert". It is no matter for wonder that a spirit of such unquenchable enthusiasm, in a personality of such charm, gained and kept an immense influence in the widening circle of those who had been his pupils and remained his devoted friends. Medical Science in America, and in many other countries, is enriched by the memory of his life, his character and his achievements.

H. H. Dale

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